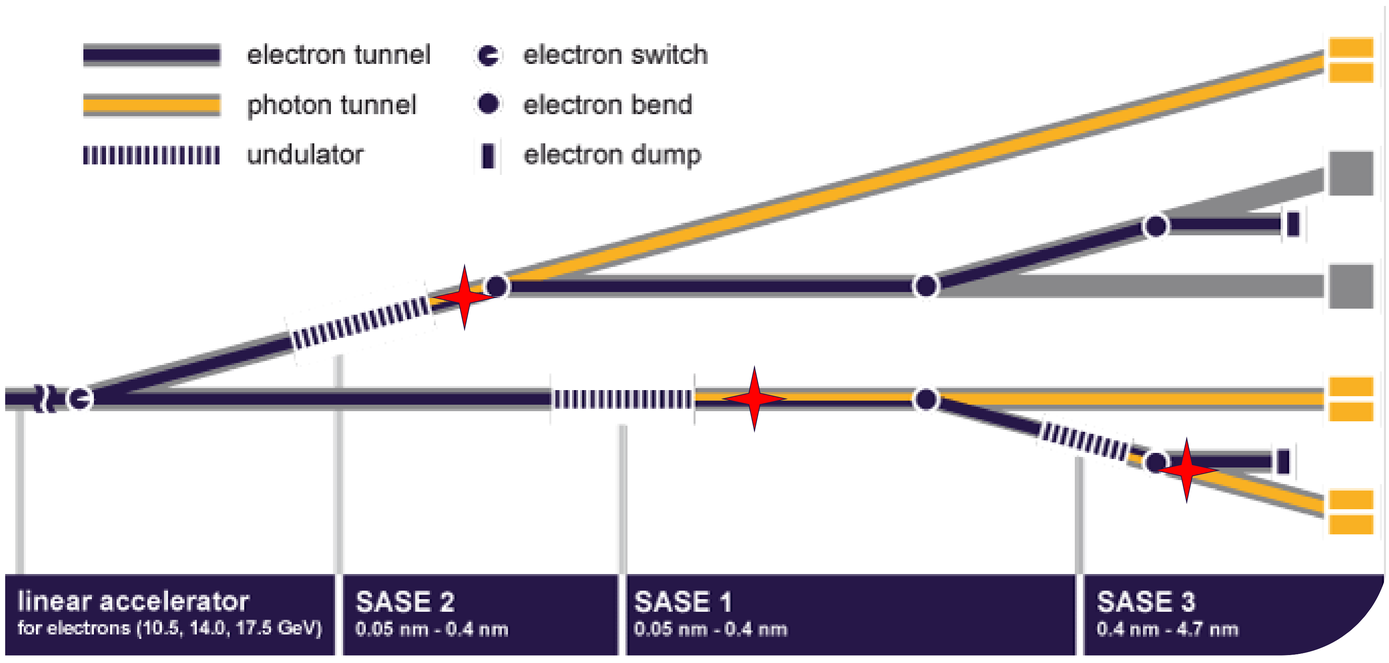
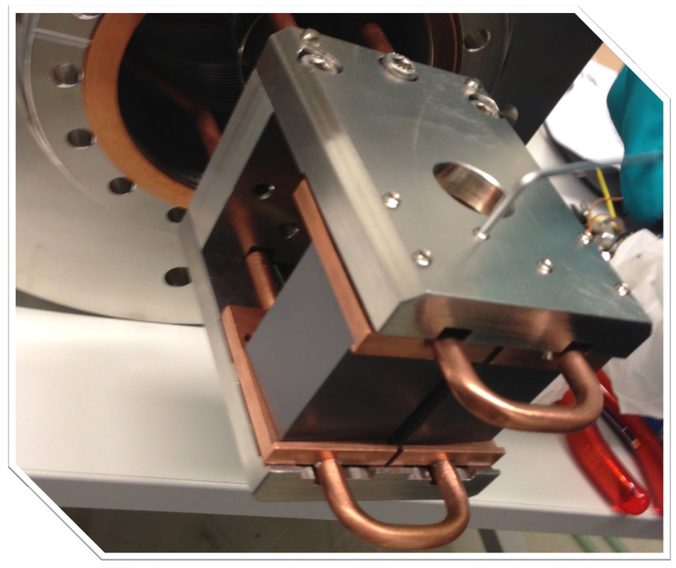
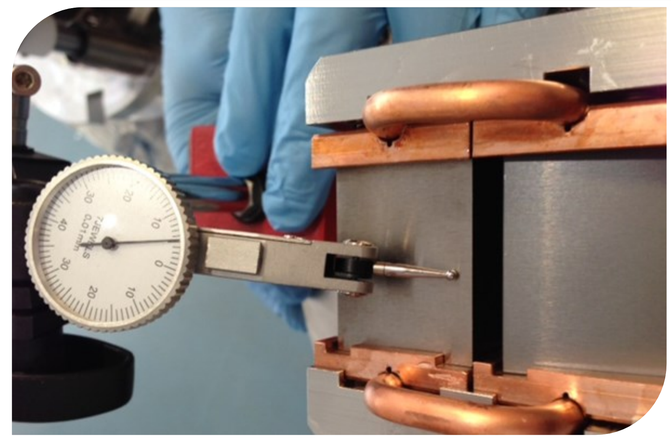
Development of a primary slits system (Spontaneous Radiation Apertures) for European XFEL photon beamlines

Xiaohao Dong on behalf of the development team of WP73 (X-Ray Optics and Bean Transport group),
European XFEL GmbH, Hamburg 22761, Germany

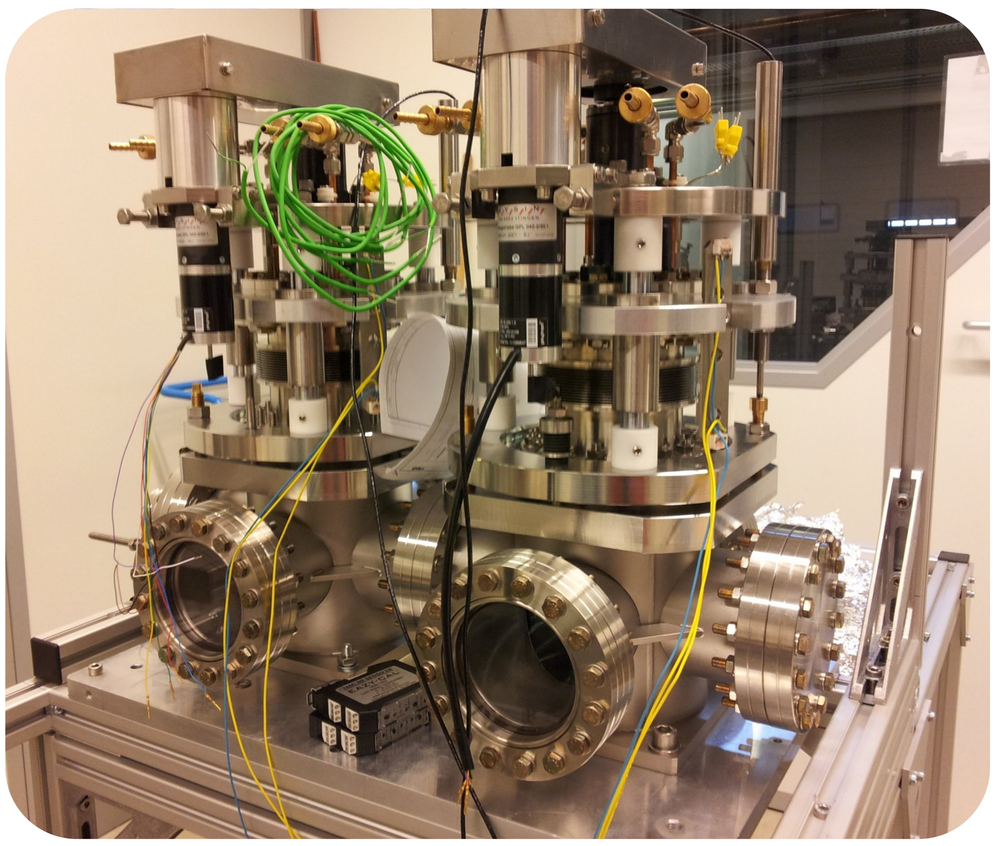
Function: to separate the FEL beam from the non-lasing part of the undulator spectrum and to reduce the so-called spontaneous background radiation around. That is achieved by the 'sandwich' style blades with combination of 'low-Z' and 'high-Z' material. The blades consist of tungsten blocks, which are protected by B4C blocks. The blades assembly is water-cooled and held together by a spring clamping mechanism, to shield and to limit heat load on the following downstream optics, and to transmit pulses as much as possible during a pulse train.







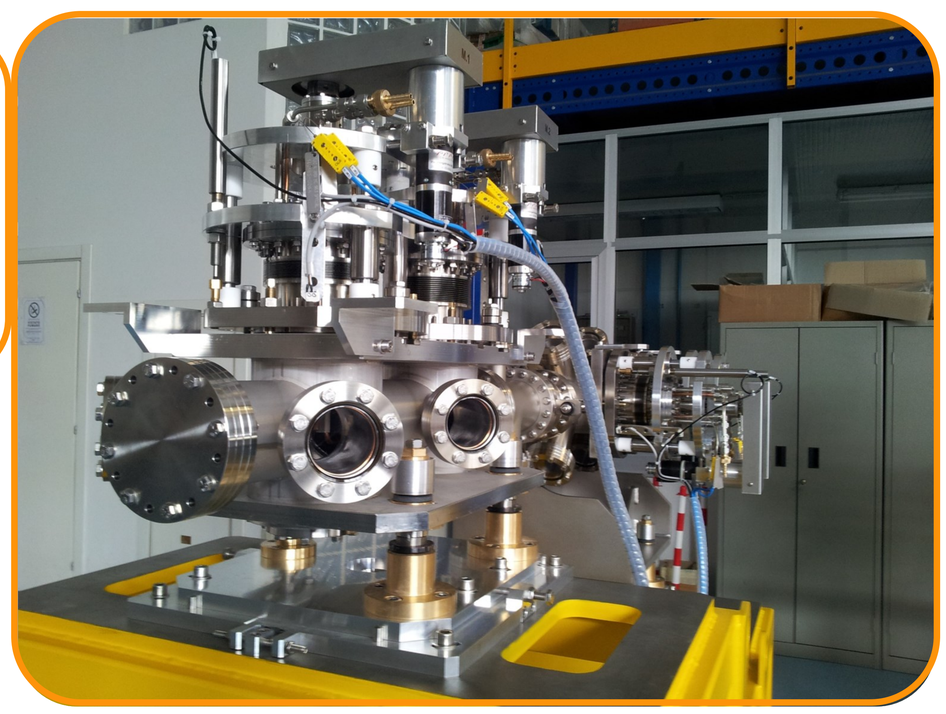
Prototype: consisting of only two blades orientated in either horizontally or vertically on a service table, and tested for cooling performance with thermocouples and circuit pressure, vacuum performance, and movement with LVDTs as well.



FAT: with some minor modification based on the prototype , three complete sets, consisting of two horizontal and two vertical blades, together with support tables of alignment capabilities.

SAT: delivered in June 2014, final tests in process in the lab.

Each blade assembly is manipulated by a motorized stage outside of vacuum chamber, to make the apertures adjustable. This is required during the commissioning phase of the facility and during user operation to adjust the aperture for different lasing energies. Furthermore, the SRAs will be integrated into Machine Protection System, and modified versions could be as photon beam monitors or beam shaping apertures.



Special thanks to the company ALCA Technology S.r.l, Italy, who manufactured (detailed design made by the Studio R.P.M, Italy) all the SRAs set-up.

Many thanks to all the colleagues involved, especially for help from vacuum team and controls team at European XFEL for pre-commissioning.

www.xfel.eu **xiaohao.dong@xfel.eu**